

22d to 29th, and 31st; in Oregon on the 3d, 5th, 7th, 8th, 10th, 11th, 16th, 17th, 23d, 25th, 28th, and 29th; in Utah on the 3d to 6th, 15th, 17th to 19th, 21st, and 23d to 31st; in Washing-

ton on the 5th, 15th to 18th, and 23d to 25th; and in Wyoming on the 3d, 6th to 12th, 14th, 16th to 19th, 23d, 24th, and 26th to 31st.

### MISCELLANEOUS PHENOMENA.

#### DROUGHT.

The month was very dry, and damage to crops by drought was reported over the greater part of lower Michigan, and in east-central South Dakota, southeast Kansas, south Texas, east Arizona, and northwest Washington. In the early part of the month drought conditions prevailed in parts of east

Wisconsin, southern Indiana, southwest Illinois, and parts of Kentucky.

#### FOREST FIRES.

Destructive forest fires occurred in Chippewa Co., Mich., northern Wisconsin, in Marion, Santa Clara, and Tuolumne counties, Cal., and in the Olympic Mountains near Port Angeles, Wash.

### VERIFICATIONS.

#### FORECASTS FOR 48 HOURS IN ADVANCE.

Appreciating the great importance that long time predictions possess for the general public the Chief of the Weather Bureau has authorized forecasts for 48 and 72 hours, covering the 2d and 3d days in advance. These are optional with the forecast official, and are only made when clearly in the public interest, and cover, in all cases, considerable areas of country, and are not confined to localities.

Percentages of verifications made for second day in advance. Number of predictions made: weather, 135; temperature, 28. Percentages of verifications: weather, 91; temperature, 85; weather and temperature combined, 90.2.

#### WIND SIGNALS FOR JULY, 1891.

Statement showing percentages of justifications of wind signals for the month of July, 1891.

*Wind signals*—(Ordered by Professor H. A. Hazen.)—Total number of signals ordered, 65; justified as to velocity, wholly, 39, partly, 2; justified as to direction, 61. All of the signals ordered were cautionary; 25 signals were ordered for easterly winds, of which 22 were justified, and 40 were ordered for westerly winds, of which 39 were justified. Percentage of justifications, 58.9.

No cold-wave signals were ordered, and no temperature-fall warnings were issued during the month.

[Verifications made by Assistant Professor C. F. Marvin, assisted by Mr. H. E. Williams, chief clerk of the Forecast Room.]

#### FORECASTS FOR 24 HOURS IN ADVANCE.

The forecasts for districts east of the Rocky Mountains for July, 1891, were made by Professor H. A. Hazen, Weather Bureau, and those for the Pacific coast districts were made at

San Francisco, Cal., by 1st Lieutenant John P. Finley, 15th Infantry.

*Percentages of forecasts verified, July, 1891.*

State.	Weather.	Temperature.	Weather and temperature combined.	State.	Weather.	Temperature.	Weather and temperature combined.
Maine .....	88.7	68.4	80.6	Arkansas .....	83.2	74.5	79.7
New Hampshire .....	83.9	76.8	81.1	Tennessee .....	84.2	79.7	82.4
Vermont .....	86.5	69.0	79.5	Kentucky .....	90.6	82.9	87.5
Massachusetts .....	91.3	73.9	81.3	Ohio .....	91.6	81.9	87.7
Rhode Island .....	91.3	76.8	85.5	West Virginia .....	92.9	75.2	86.4
Connecticut .....	86.8	71.6	80.7	Indiana .....	94.2	81.9	90.3
Eastern New York .....	87.7	69.0	80.2	Illinois .....	89.4	80.6	85.6
Western New York .....	82.6	71.3	78.1	Lower Michigan .....	86.8	81.0	84.5
Eastern Pennsylvania .....	83.2	66.5	76.5	Upper Michigan .....	81.9	72.6	78.2
Western Pennsylvania .....	83.2	60.6	72.2	Wisconsin .....	86.5	75.2	82.0
New Jersey .....	79.7	65.8	74.1	Minnesota .....	90.3	79.0	82.2
Delaware .....	80.3	78.1	79.4	Iowa .....	89.7	81.6	86.5
Maryland .....	82.0	73.5	78.6	Kansas .....	83.2	73.5	79.3
District of Columbia .....	77.7	77.4	77.6	Nebraska .....	87.4	78.4	83.8
Virginia .....	83.9	77.4	81.3	Missouri .....	90.3	78.4	85.5
North Carolina .....	80.6	79.4	80.1	Colorado .....	89.4	61.6	78.3
South Carolina .....	86.8	78.1	83.3	North Dakota .....	88.1	82.9	85.0
Georgia .....	91.6	88.7	90.4	South Dakota .....	88.4	77.1	83.9
Eastern Florida .....	75.8	92.3	82.4	Southern California .....	98.7	91.0	95.6
Western Florida .....	85.2	94.5	88.9	Northern California .....	98.1	87.4	93.8
Alabama .....	90.0	88.4	89.4	Oregon .....	93.9	84.9	90.3
Mississippi .....	88.4	89.4	85.8	Washington .....	92.3	84.9	89.3
Louisiana .....	83.2	83.5	83.3				
Texas .....	88.7	83.9	87.1	Monthly percentage ..	86.4	77.7	82.9

In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. The forecasts of temperature in districts east of the Rocky Mountains for July, 1891, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day. The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

### STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for July, 1891, of the directors of the various state weather services:

#### ALABAMA.

*Temperature*.—The mean was 5.3 below the normal; maximum, 100, at Wiggins, 20th, and at Brewton, 1st; minimum, 50, at Camden, 19th; greatest monthly range, 41, at Camden; least monthly range, 22, at Chepultepec.

*Precipitation*.—The average was 1.37 above the normal; greatest monthly, 10.05, at Valley Head; least monthly, 1.89, at Fort Deposit.

*Wind*.—Prevailing direction, east.—P. H. Mell, Observer, Weather Bureau, Auburn, director.

#### ARKANSAS.

*Temperature*.—The mean was 4.6 below the average; maximum, 103, at Lead Hill, 22d; minimum, 50, at Fayetteville and Rogers, 9th; greatest monthly range, 50, at Lead Hill; least monthly range, 17, at Winslow.

*Precipitation*.—The average was 4.14 above the normal; greatest monthly, 12.86, at Hot Springs; least monthly, 2.10, at Lead Hill.

*Wind*.—Prevailing direction, southwest.—M. F. Locke, Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Observer, Weather Bureau, assistant.

#### COLORADO.

*Temperature*.—Maximum, 102, at Fruita, 24th; minimum, 10, at Breckenridge, 2d; greatest monthly range, 75, at Breckenridge; least monthly range, 31, at Climax.

*Precipitation*.—Greatest monthly, 8.26, at Brandon; least monthly, 0.28, at Grover.—W. S. Miller, Observer, Weather Bureau, Denver, director.

#### ILLINOIS.

*Temperature*.—The mean was 5.2 below the normal of the last 16 years;